

Serial No. 10/708,860
Hiroyuki Akatsu et al.

REMARKS

Claims 1-10 and 21-28 are pending in the application with the present amendments. In the Office Action, all claims were rejected under 35 U.S.C. 102 as anticipated by each of the following references: U.S. Patent No. 6,964,907 to Hopper et al. ("Hopper"), U.S. Patent No. 6,492,238 to Ahlgren et al. ("Ahlgren") or U.S. Patent No. 6,777,302 to Chen et al. ("Chen"), or rejected under 35 U.S.C. 103 as obvious over *Hopper*, or as obvious over *Hopper* in view of U.S. Patent No. 7,022,578 to Verma et al. ("Verma"),

As amended herein, claim 1 now recites a bipolar transistor having a collector layer which includes an active portion having a relatively high dopant concentration and a second portion having a low dopant concentration of less than about $5 \times 10^{16} \text{ cm}^{-3}$. An example of the low dopant concentration portion is indicated by reference numeral 15 in FIG. 6. The relatively high concentration active portion is shown, for example, by reference numeral 52 in FIG. 6. These differently doped portions of the collector layer remain in the completed transistor structure shown in FIG. 3, where reference numeral 52 is laterally internal to the low dopant concentration second portion. As shown in FIG. 3, the low dopant concentration second portion is adjacent to a void 56. Paragraphs [0032] through [0036] of the specification describe how these differently doped portions of the collector layer come to be, in accordance with an embodiment of the invention.

Serial No. 10/708,860
Hiroyuki Akatsu et al.

None of the references used to reject the claims teach this feature of the invention recited in claim 1. No mention is made of a comparable feature in any of the cited references.

On the other hand, amended claim 2 now recites a structure in which an epitaxial intrinsic base layer overlies the collector layer of the transistor, and a low capacitance region including an evacuated or gas-filled void underlies the intrinsic base layer. In *Hopper*, an air gap (col. 4, Ins. 10-15) is formed by laterally etching trenches in the monocrystalline silicon crystal (col. 2, Ins. 27-57; col. 3, Ins. 48-51) which underlies the extrinsic base region 208. *Hopper* lacks any teaching of an epitaxial intrinsic base layer overlying the air gap in the completed transistor. None of the other cited references including *Ahlgren*, *Chen* and *Verma* teach a bipolar transistor having a void.

As all other claims depend from either claim 1 or claim 2, applicants respectfully submit that all claims are fully distinguished from the references cited in the Office Action.

Support for the present amendments is provided, *inter alia*, at paragraphs [0028] through [0036] of the Specification.

In view of the foregoing amendments and remarks, applicants respectfully submit that the application is in immediate condition for allowance. If, for any reason, any question remains at this time regarding whether such action can be taken, the Examiner is respectfully requested to telephone the undersigned at the number indicated below.

FIS920030415US1

7

Serial No. 10/708,860
Hiroyuki Akatsu et al.

It is believed that no fees are required to be filed in connection with this amendment. However, if any fees are required, authorization is given to debit the Deposit Account No. 09-0458 of the Assignee International Business Machines Corporation. If there is an overpayment, please credit the same account.

Respectfully submitted,
Hiroyuki Akatsu et al.

By:


Daryl K. Neff, Attorney
Registration No. 38,253
Telephone: (973) 316-2612